



BEADS Ca-ALGINAT-KAOLIN SEBAGAI ADSORBEN GAS CO₂

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INTISARI

Telah dilakukan penelitian tentang sintesis *beads* Ca-alginat-kaolin sebagai adsorben CO₂. Pembuatan *beads* Ca-alginat-kaolin dilakukan dengan cara meneteskan larutan campuran Na-alginat dan kaolin ke larutan CaCl₂ 0,5 M. Variasi massa, laju alir dan waktu kontak digunakan untuk menentukan kapasitas adsorpsi. Pengujian kapasitas adsorpsi dilakukan dengan alat gas *trap system* secara kontinyu. Karakterisasi dilakukan menggunakan FTIR dan SEM. Pemodelan kinetika menggunakan *pseudo* orde pertama Lagergren dan *pseudo* orde kedua Ho, sedangkan pemodelan adsorpsi menggunakan isoterm Langmuir dan Freundlich.

Hasil menunjukkan bahwa *beads* Ca-alginat-kaolin dapat digunakan sebagai adsorben gas CO₂ dan memiliki kapasitas adsorpsi yang lebih besar dibandingkan dengan *beads* Ca-alginat. Kapasitas adsorpsi optimal yang didapatkan dengan rasio kaolin : alginat (1 : 3) pada laju alir 30 mL menit⁻¹ dan waktu kontak 15 menit sebesar 0,1067 mmol g⁻¹. Adsorpsi gas CO₂ mengikuti model kinetika *pseudo* orde pertama Lagergren. Model isoterm yang sesuai untuk proses adsorpsi gas CO₂ adalah model isoterm Freundlich dengan nilai K_F 0,304 mmol g⁻¹. Energi adsorpsi *beads* Ca-alginat-kaolin sebesar 26,681 kJ mol⁻¹. Adsorpsi gas CO₂ dengan *beads* Ca-alginat-kaolin merupakan fisisorpsi.

Kata kunci: kaolin, *beads*, gas CO₂, alginat, adsorpsi



Ca-ALGINATE-KAOLINITE BEADS FOR CO₂GAS ADSORBENT

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ABSTRACT

Ca-alginate-kaolinite beads for CO₂ gas adsorbent has been studied. Ca-alginate-kaolinite was prepared by dropping Na-alginate and kaolinite into the solution of 0.5 M CaCl₂. Variations of mass, flow rate and contact time were done to determine adsorption. Adsorption capacity was determined by using gas trap system continuously. Characterization of product was performed by using FTIR and SEM. The kinetic modeling was fit to pseudo first order Lagergren and pseudo second order Ho, whereas isothermal adsorption was fit to Langmuir and Freundlich. The results showed that beads of Ca-alginate-kaolinite can be used as CO₂ gas adsorbent, it has a larger capacity than the Ca-alginate beads. The gas adsorption capacity was obtained by ratio kaolinite : alginate (1 : 3) at a flow rate of 30 mL min⁻¹ and 15 minutes of contact time was 0.1067 mmol g⁻¹. Adsorption of CO₂ is fit to the pseudo first order of Lagergren. The CO₂ gas adsorption process in this research was the Freundlich isotherm models with the K_F 0.304 mmol g⁻¹. The adsorption energy of Ca-alginate-kaolinite beads was 26.681 kJ mol⁻¹. The CO₂ gas adsorption with Ca-alginate-kaolinite beads was found to be physisorption.

Keyword: kaolinite, beads, CO₂ gas, alginate, adsorption